

A PLIOCENE TEAL FROM SOUTH DAKOTA

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THE living green-winged teal, *Nettion crecca* (Linnaeus), is a species of Holarctic distribution, represented in North America and Eurasia by slightly differentiated geographic races. In the Upper Pleistocene the species is recorded from no less than 32 sites in Europe, Asia, and North America (Brodkorb, 1964). *N. bunkeri* Wetmore (1944), a larger and apparently ancestral species, replaces it during the time interval near the Pleistocene-Pliocene boundary at several localities in western North America. In the Lower Pliocene the presence of a large species in Germany, *N. eppelsheimense* (Lambrecht, 1933), and a very small one in Kansas, *N. ogallalae* Brodkorb (1962), suggests that more than one phyletic line of *Nettion* occurred in the northern hemisphere. The genus first makes its appearance in the Upper Miocene of France with *N. velox* (Milne-Edwards, 1867).

The suggestion of a multiplicity of phyletic lines within the genus during the Tertiary is strengthened by a specimen forwarded to me for study by Dr. Morton Green of the South Dakota School of Mines and Technology. In some respects this Lower Pliocene fossil exhibits more similarity to certain southern hemisphere teals that it does to the northern species. It is described below.

Nettion greeni, new species

Holotype. Distal half of right humerus (fig. 1), South Dakota School of Mines and Technology no. 63576. From Lower Pliocene in lower part of Ash Hollow Formation, at SDSM locality V631, D. C. Rice ranch, 3 miles northeast of Tuthill, Bennett County, South Dakota. Collected by Morton Green and Robert W. Wilson, July 22, 1963.

Diagnosis. Humerus agrees in characters with *Nettion* Kaup, as previously outlined (Brodkorb, 1962). Differs from living *N. crecca* (Linnaeus) and agrees with *N. ogallalae* from the Ogallala Formation of Kansas in having ectepicondyle rounded in lateral view and falling short of distal end of external condyle; largest foramen on palmer face close to tip of external condyle; scar of pronator longus with much medial thrust.



Fig. 1. *Nettion greeni*, n. sp. Holotype humerus (actual length, 27.5 mm.).

Differs from *N. ogallalae* in having entepicondyle compressed in anconal view; proximal leg of entepicondyle straight in medial view (concave in *N. ogallalae*); pit for pronator bevis, in palmar view, in line with edge of shaft (bulging beyond shaft line in *N. ogallalae*), and in medial view pit long and mostly below level of upper end of facet for anterior articular ligament (pit rounded and mostly above level of upper end of facet in *N. ogallalae*); brachial depression very deep and extending distally nearly to facet for anterior articular ligament (in *N. ogallalae*, *N. crecca*, and the South American *N. leucophrys* brachial depression very shallow and distant from facet).

Measurements. Distal width, 9.1; width of shaft, 4.3 mm. Size thus larger than the type of *N. ogallalae*, near minimum of *N. crecca*, and much smaller than *N. eppelsheimense*. The hu-

merus of *N. bunkerii* and that of *N. velox* are still unknown, but these are both relatively large species of teal.

DISCUSSION

The functional significance of the enlargement, deepening, and distal encroachment of the brachial depression is unclear. *M. brachialis*, which originates here, flexes the forearm on the humerus and depresses the posterior edge of the wing. When contraction of *M. triceps* prevents flexion of the forearm, *M. brachialis* depresses the posterior edge of the wing or holds the forearm horizontal against the great force of the air on the under surface of the secondaries (Fisher, 1946). Fisher was unable to correlate the development of *M. brachialis* with either soaring or flapping flight in vultures. Among the Pelecaniformes, however, I note that the brachial depression is large and deep and extends distally to the lower end of the facet for the anterior articular ligament in cormorants (*Phalacrocorax*), which flap, whereas it is shallow, shorter, and more proximal in darters (*Anhinga*), which soar.

Some of the living southern hemisphere teals, notably *Nettion flavirostre* (Vieillot) and *N. brasiliense* (Gmelin) of South America and *N. castanea* (Eyton) of Australia, have a deep brachial depression, although they differ from *N. greeni* in other characters.

If an analogy to the Pelecaniformes could be made here in a different order, it would seem to suggest that *N. greeni* was a bird with even greater ability than other northern hemisphere teals to rise from the water in rapid, vertical flight.

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